Hawley's

Condensed Chemical

Dictionary

THIRTEENTH EDITION

Revised by

Richard J. Lewis, Sr.

VAN NOSTRAND REINHOLD

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Alabama, California, Pennsylvania, Cyprus, and Italy. Burnt sienna is an orange-brown pigment made by calcining raw sienna.
See ocher; iron oxide reds.
Use: Colorant in oil paints, stains, pastels, etc.

sieve. See screen.

Sievert's law. Refers to the solubility of molecules that dissociate during solution, varies as the square root of the pressure.

siglure. (generic name for *sec*-butyl-6-methyl-3-cyclohexane-1-carboxylate).
$CH_3C_6H_8COOCH(CH_3)C_2H_5$.
Properties: Liquid. Bp 113–114C (15 mm Hg). Soluble in most organic solvents; insoluble in water. Combustible.
Use: Insect attractant.

sigma blade. A rotating agitator set horizontally in a kneading bowl or chamber used for mixing doughs and heavy pastes. The blade or arm is shaped somewhat like a Greek capital sigma (Σ) lying on its side; variations of this shape simulate horizontal letters S and Z. Some kneaders have two such blades that overlap as they turn to provide maximum mixing efficiency.
See kneading.

sigma bond. A covalent bond directed along the line joining the centers of two atoms. They are the normal single bonds in organic molecules.
See pi bond.

sigma function. Enthalpy of an air-stream mix, minus the heat of the liquid.

sigma phase. The nonmagnetic, brittle, corundum-hard FeCr constituent in stainless steel.

sigma value. The value of a quantum number, which quantizes the component of angular momentum, of spin about the axis of a diatomic molecule.

sig water. The alkaline solution of soda ash, borax, or ammonia for washing the grain surface of leather before applying color or dye.

silane. (silicon tetrahydride).
CAS: 7803-62-5. SiH_4.
Properties: A gas; repulsive odor. Solidifies at −200C, bp −112C, d 0.68. Decomposes in water; insoluble in alcohol and benzene.
Hazard: Dangerous fire risk, ignites spontaneously in air. Strong irritant to tissue. TLV: 5 ppm in air.
Use: Doping agent for solid-state devices, production of amorphous silicon.

silane compounds. Gaseous or liquid compounds of silicon and hydrogen (Si_nH_{2n+2}), analogous to alkanes or saturated hydrocarbons. SiH_3 is called silyl (analogous to methyl), and Si_2H_5 is disilanyl (analogous to ethyl). A cyclic silicon and hydrogen compound having the formula SiH_2 is called a cyclosilane. Organofunctional silanes are noted for their ability to bond organic polymer systems to inorganic substrates.
Hazard: Dangerous fire risk.
See silicone; siloxane.

"Silastic" ***[Dow Corning].*** TM for compositions in physical character comparable to milled and compounded rubber prior to vulcanization but containing organosilicon polymers. Parts fabricated of "Silastic" are serviceable from −73 to +260C, retain good physical and dielectric properties in such service, show excellent resistance to compression set, weathering, and corona. Thermal conductivity is high, water absorption low.
Use: Diaphragms, gaskets and seals, O-rings, hose, coated fabrics, wire and cable, and insulating components for electrical and electronic parts.

"Silbond" ***[Stauffer].*** TM for ethyl silicate, available as pure, condensed, prehydrolyzed, and specialty formulations.

silica. (silicon dioxide). SiO_2. Occurs widely in nature as sand, quartz, flint, diatomite.
Properties: Colorless crystals or white powder; odorless and tasteless. D 2.2–2.6; thermal conductivity about half that of glass, mp 1710C, bp 2230C, high dielectric constant, high heat and shock resistance. Insoluble in water and acids except hydrogen fluoride; soluble in molten alkai when finely divided and amorphous. Combines chemically with most metallic oxides; melts to a glass with lowest known coefficient of expansion (fused silica). Noncombustible.
Derivation: Can be made from a soluble silicate (water glass) by acidification, washing and ignition. Arc silica is made from sand, vaporized in a 3000C electric arc.
Grade: By purity and mesh size, silica aerogel, hydrated, precipitated.
Hazard: Toxic by inhalation, chronic exposure to dust may cause silicosis.
Use: (Powder) Manufacture of glass, water glass, ceramics, abrasives, water filtration, microspheres, component of concrete, source of ferrosilicon and elemental silicon, filler in cosmetics, pharmaceuticals, paper, insecticides, hydrated and precipitated grades as rubber reinforcing agent, including silicone rubber, anticaking agent in foods, flattening agents in paints, thermal insulator. (Fused) Ablative material in rocket engines, spacecraft, etc.; fibers in reinforced plastics; special camera lenses. (Amorphous) Silica gel.
See quartz; silicic acid; silica gel.

silica, fumed. A colloidal form of silica made by combustion of silicon tetrachloride in hydrogen-oxygen furnaces. Fine, white powder.

Gibbs phthalic anhydride process. Oxidation of naphthalene to phthalic anhydride with air at 360C over vanadium pentoxide and other catalysts.

giga-. Prefix meaning 10^9 units (symbol = G). 1 Gg = 1 gigagram = 10^9 grams.

Gilbert, Walter. (1932–). An American molecular biochemist who won the Nobel Prize for chemistry in 1980 along with Berg and Sanger for their studies of the chemical structure of nucleic acid. Author of many papers on theoretical physics and molecular biology. He has been at Harvard since 1972.

gilsonite. An asphaltic material or solidified hydrocarbon found only in Utah and Colorado. One of the purest (9.9%) natural bitumens. Said to be the first solid hydrocarbon to be converted to gasoline.
Hazard: Irritant, skin sensitizer.
Use: Acid, alkali, and waterproof coatings; black varnishes, lacquers, baking enamels, and japans; wire-insulation compounds; linoleum and floor tile; paving; insulation; diluent in low-grade rubber compounds; possible source of gasoline, fuel oil, and metallurgical coke.
See asphalt; bitumen.

gin. An alcoholic beverage made by distilling alcohol through a mixture of herbs and berries (juniper, coriander, etc.) and adjusting to 80–100 proof.
Properties: Flash p 90F (32.3C).
Hazard: Flammable, moderate fire risk. Slight irritant, intoxicant.

Girard's reagent. (Girard's "P": carboxymethylpyridinium chloride hydrazide; acethydrazidepyridinium chloride). $C_5H_5NClCH_2CONHNH_2$. (Girard's "T": carboxymethyltrimethyl ammonium chloride hydrazide; trimethylacethydrazide ammonium chloride). $(CH_3)_3NClCH_2CONHNH_2$.
Properties: White to faintly pinkish crystals; little or no odor. Mp 190–200C. Soluble in water; insoluble in oils. T is hygroscopic.
Use: Separation of aldehydes and ketones from natural oily or fatty materials; extraction of hormones.

Girbotol absorption. (amine absorption). A process for the removal of hydrogen sulfide or carbon dioxide from a gaseous mixture. An organic amine (ethanolamine or diethanolamine, which are basic) is allowed to flow down a tortuous path through a tower where it is contacted by and absorbs (acidic) hydrogen sulfide or carbon dioxide from the gas to be purified as it moves up the tower. The amine, contaminated with these products, is then sent from the bottom of the tower to a steam stripper where it flows countercurrent to steam, which strips the hydrogen sulfide or carbon dioxide from it. The amine is then returned to the top of the tower. The process is widely used in the petroleum industry for purifying refinery and natural gases and for recovery of hydrogen sulfide for sulfur manufacture. Removal of carbon dioxide from gases is usually done with monoethanolamine.

glacial. A term applied to a number of acids, e.g., acetic and phosphoric, that have a freezing point slightly below room temperature when in a highly pure state. For example, glacial acetic acid is 99.8% pure and crystallizes at 16.6C.

glance. A mineralogical term meaning brilliant or lustrous; used to describe hard, brittle materials that exhibit a bright reflecting surface when fractured. Examples of such materials are hard asphalts (glance pitch) and ores of certain metals such as lead glance (galena).

Glaser coupling. Coupling of terminal acetylenes by shaking an aqueous solution of cuprous chloride –ammonium chloride and the alkyne in an atmosphere of air or oxygen.

glass. A ceramic material consisting of a uniformly dispersed mixture of silica (sand) (75%), soda ash (20%), and lime (5%), often combined with such metallic oxides as those of calcium, lead, lithium, cerium, etc., depending on the specific properties desired. The blend (or "melt") is heated to fusion temperature (approximately 700–800C) and then gradually cooled (annealed) to a rigid, friable state, often referred to as vitreous. Technically, glass is an amorphous, undercooled liquid of extremely high viscosity that has all the appearances of a solid. It has almost 100% elastic recovery.
See glass, optical.
Properties: (Soda-lime glass) Lowest electrical conductivity of any common material (below 10^{-6} mho/cm). Low thermal conductivity. High tensile and structural strength. Relatively impermeable to gases. Inert to all chemicals except hydrofluoric, fluosilicic, and phosphoric acids and hot, strong alkaline solutions. Continuous highest-use temperature about 121C but may be higher, depending on composition. Good thermal insulator in fibrous form. Molten glass is extrudable into extremely fine filaments. Glass is almost opaque to UV radiation; in the absence of added colorant it transmits 95–98% of light to which it is exposed. Noncombustible.
Occurrence: Natural glass is rare but exists in the form of obsidian in areas of volcanic activity and meteor strikes. Excellent sand for glassmaking occurs in Virginia (James River), Pennsylvania, Massachusetts, New Jersey, West Virginia, Illinois, and Maryland; also in southern Germany and the Czech Republic.
Available forms: Plate, sheet, fiber, filament, fabric, rods, tubing, pipe, powder, beads, flakes, hollow spheres.